WHAT IS CLAIMED IS:

1. A semiconductor laser device, which is used as a pump source for an optical fiber amplifier that amplifies a light based on a Raman amplification employing a co-propagating pumping system, comprising:

an emission facet with a first reflection coating;

a reflection facet with a second reflection coating;

an active layer that is formed between the first reflection coating and the second reflection coating; and

an optical cavity that is formed by the emission facet and the reflection facet, and emits a light of which number of longitudinal modes is equal to or more than 2 and equal to or less than 60, wherein each longitudinal mode has an intensity difference equal to or less than 10 decibels from a maximum intensity.

2. The semiconductor laser device according to claim 1, wherein a length of the optical cavity is equal to or longer than 800 micrometers.

3. A semiconductor laser device comprising:

an emission facet with a first reflection coating;

a reflection facet with a second reflection coating;

an active layer that is formed between the first reflection coating and the second reflection coating; and

a grating that is disposed adjacent to the active layer and that selects a light of which number of longitudinal modes is equal to or more than 2 and equal to or less than 60, wherein each longitudinal

mode has an intensity difference equal to or less than 10 decibels from a maximum intensity.

4. The semiconductor laser device according to claim 3, wherein the grating selects a light of a wavelength between 1100 nanometers and 1550 nanometers.

5. The semiconductor laser device according to claim 3, wherein the grating is such that a product of a coupling coefficient and a length of the grating is equal to or less than 0.3.

6. The semiconductor laser device according to claim 3, wherein the grating has either of a randomly changed period and a fixed period.

7. A semiconductor laser module, comprising:

a semiconductor laser device that has

an emission facet with a first reflection coating;

a reflection facet with a second reflection coating;

an active layer that is formed between the first reflection coating and the second reflection coating; and

a grating that is disposed adjacent to the active layer and that selects a light of which number of longitudinal modes is equal to or more than 2 and equal to or less than 60, wherein each longitudinal mode has an intensity difference equal to or less than 10 decibels from a maximum intensity;

an optical fiber that guides a laser light output from the semiconductor laser device to the outside; and

an optical coupling lens system that optically couples the semiconductor laser device and the optical fiber.

8. The semiconductor laser module according to claim 7, further comprising a temperature controller that controls a temperature of the semiconductor laser device.

9. The semiconductor laser module according to claim 7, further comprising an isolator that is disposed within the optical coupling lens system, and that blocks light reflecting from the optical fiber.

10. The semiconductor laser device according to claim 7, wherein the optical fiber has a facet that is coupled with the semiconductor laser device, wherein the facet is tilted so that the light from the semiconductor laser device is incident on the facet of the optical fiber at an oblique angle.

11. An optical fiber amplifier, comprising:

a pump source with a semiconductor laser module including a semiconductor laser device, an optical fiber that guides a laser light output from the semiconductor laser device to the outside, and an optical coupling lens system that optically couples the semiconductor laser device and the optical fiber, wherein the semiconductor laser

device includes

an emission facet with a first reflection coating;

a reflection facet with a second reflection coating;

an active layer that is formed between the first reflection coating and the second reflection coating; and

a grating that is disposed adjacent to the active layer and that selects a light of which number of longitudinal modes is equal to or more than 2 and equal to or less than 60, wherein each longitudinal mode has an intensity difference equal to or less than 10 decibels from a maximum intensity;

an optical transmission line to transmit a signal light;

an optical fiber for amplification that is connected to the optical transmission line and amplifies the signal light based on a Raman amplification;

a coupler that inputs a pump light from the pump source into the optical fiber; and

an optical transmission line for the pump light that connects the pump source and the coupler.

12. A semiconductor laser device comprising:

an emission facet with a first reflection coating;

a reflection facet with a second reflection coating;

an active layer formed between the first reflection coating and the second reflection coating, and outputs a laser light having a plurality of longitudinal modes; and

a modulation unit that generates a modulation signal for modulating a bias current injected into the active layer and, superimposes the modulation signal on the bias current, wherein the modulation unit gives a return loss of a stimulated Brillouin scattering equal to or less than a value obtained by adding a predetermined value to a Rayleigh scattering level based on the modulation of the laser light.

13. The semiconductor laser device according to claim 12, wherein the predetermined value is 2 decibels.

14. The semiconductor laser device according to claim 12, wherein the predetermined value is 1 decibel.

15. The semiconductor laser device according to claim 11, further comprising a grating adjacent to the active layer, wherein a plurality of longitudinal modes are generated within a full width at half maximum of an oscillation spectrum based on a setting of a combination of oscillation parameters including a cavity length and wavelength selective characteristics of the grating.

16. A semiconductor laser device comprising:

an emission facet with a first reflection coating;

a reflection facet with a second reflection coating;

an active layer formed between the first reflection coating and the second reflection coating, and outputs a laser light having a plurality

of longitudinal modes; and

a grating that selects a plurality of high power longitudinal modes, wherein each longitudinal mode has an intensity difference equal to or less than 10 decibels from a maximum intensity, wherein the grating gives a return loss of a stimulated Brillouin scattering equal to or less than a value obtained by adding a predetermined value to a Rayleigh scattering level based on the selected number of the high power longitudinal modes.

17. The semiconductor laser device according to claim 16, wherein the predetermined value is 2 decibels.

18. The semiconductor laser device according to claim 16, wherein the predetermined value is 1 decibel.

19. A semiconductor laser module, comprising:

a semiconductor laser device that has

an emission facet with a first reflection coating;

a reflection facet with a second reflection coating; and

an active layer formed between the first reflection coating and the second reflection coating, and outputs a laser light having a plurality of longitudinal modes;

an optical fiber that guides a laser light output from the semiconductor laser device to the outside; and

an optical coupling lens system that optically couples the

semiconductor laser device and the optical fiber in such a manner that the optical coupling efficiency between the semiconductor laser device and the optical fiber is deviated from a maximum value, wherein

the semiconductor laser module gives a return loss of a stimulated Brillouin scattering equal to or less than a value obtained by adding a predetermined value to a Rayleigh scattering level based on an attenuation of the optical coupling efficiency.

20. A semiconductor laser module, comprising:

a semiconductor laser device that has

an emission facet with a first reflection coating;

a reflection facet with a second reflection coating; and

an active layer formed between the first reflection coating and the second reflection coating, and outputs a laser light having a plurality of longitudinal modes;

an optical fiber that guides a laser light output from the semiconductor laser device to the outside; and

an optical attenuator that attenuates the laser light, wherein

the semiconductor laser module gives a return loss of a stimulated Brillouin scattering equal to or less than a value obtained by adding a predetermined value to a Rayleigh scattering level based on the attenuation by the optical attenuator.

21. The semiconductor laser module according to claim 20, wherein the predetermined value is 2 decibel.

22. The semiconductor laser module according to claim 20, wherein the predetermined value is 1 decibel.

23. The semiconductor laser module according to claim 20, wherein the semiconductor laser device includes a grating that is provided adjacent to the active layer, wherein a plurality of longitudinal modes are generated within a full width at half maximum of an oscillation spectrum based on a setting of a combination of oscillation parameters including a cavity length and wavelength selective characteristics of the grating.

24. A Raman amplifier that uses either of a semiconductor laser device and a semiconductor laser module, as a pump source for a wideband Raman amplification, wherein

the semiconductor laser device has an emission facet with a first reflection coating, a reflection facet with a second reflection coating, an active layer formed between the first reflection coating and the second reflection coating, a modulation unit that generates a modulation signal for modulating a bias current injected into the active layer, and superimposes the modulation signal on the bias current, wherein the modulation unit gives a return loss of a stimulated Brillouin scattering equal to or less than a value obtained by adding a predetermined value to a Rayleigh scattering level based on the modulation of the laser light, and a grating that selects a plurality of high power longitudinal modes,

wherein each longitudinal mode has an intensity difference equal to or less than 10 decibels from a maximum intensity, wherein the grating gives a return loss of a stimulated Brillouin scattering equal to or less than a value obtained by adding a predetermined value to a Rayleigh scattering level based on the selected number of the high power longitudinal modes, wherein the semiconductor laser device outputs a laser light having a plurality of longitudinal modes, and

the semiconductor laser module includes a semiconductor laser device that has an emission facet with a first reflection coating, a reflection facet with a second reflection coating, and an active layer formed between the first reflection coating and the second reflection coating, and outputs a laser light having a plurality of longitudinal modes, an optical fiber that guides a laser light output from the semiconductor laser device to the outside; an optical coupling lens system that optically couples the semiconductor laser device and the optical fiber in such a manner that the optical coupling efficiency between the semiconductor laser device and the optical fiber is deviated from a maximum value, wherein the semiconductor laser module gives a return loss of a stimulated Brillouin scattering equal to or less than a value obtained by adding a predetermined value to a Rayleigh scattering level based on an attenuation of the optical coupling efficiency, an optical fiber that guides a laser light output from the semiconductor laser device to the outside, and an optical attenuator that attenuates the laser light, wherein the semiconductor laser module gives a return loss of a stimulated Brillouin scattering equal to or less

than a value obtained by adding 2 decibels to a Rayleigh scattering level based on the attenuation by the optical attenuator.